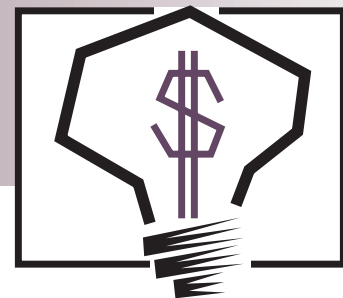


INVENTIONS & INNOVATION

Project Fact Sheet



HIGHLY-EFFICIENT OZONE GENERATOR SYSTEM

A NEW CERAMIC COATING MAKES OZONE GENERATORS MORE ENERGY AND COST-EFFICIENT

Benefits

- Ozone generators fitted with ceramic-coated metal conductors currently produce an energy savings of about 30% to 50%, but greater energy savings are likely achievable with new cooling systems
- Energy-efficient method for reducing toxins in potable water supplies
- Lower investment and operating costs
- Lower costs to produce ozone than previously attainable
- Stronger oxidizer than conventional chlorine bleaching and sterilization systems

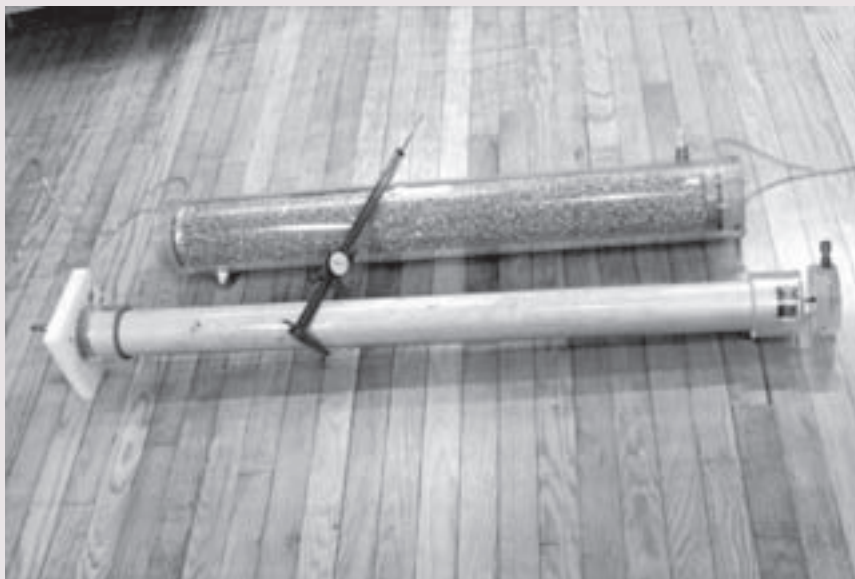
Applications

Ozone generators fitted with the dielectric improvement can be used as disinfecting and sterilizing agents for treating industrial waste, wastewater, and sewage. In addition, these generators are useful in the pulp and paper industries for product bleaching and in the food industry where they can be used to create an ozonated water wash for food preparation. Life Support, Inc., is also creating portable, self-sterilizing ozone generators for use in hospitals and clinics.

For years, chlorination has surpassed other purification methods, such as ozonation, as the primary way to treat water supplies. Due to its cost-effective nature, chlorination is the most commonly used method for treating water supplies and whitening paper products in the United States. However, the process can create dioxins, which pose a health hazard to users of municipal drinking supplies. Until now, ozonation, while safer than chlorination, has been costly because ozone generators used glass insulators with low-dielectric constants, allowing significant loss of electrical energy as heat. This heat loss resulted in higher operating costs, making ozonation more costly and less desirable than chlorination.

A new improvement in ozone generators makes ozonation more affordable. Ozone generators fitted with ceramic-coated metal conductors increase energy efficiency while minimizing the costs usually associated with ozonation for water treatment. Ultimately, more affordable ozonation processes may eliminate chlorination as the most commonly used method of water treatment.

HIGHLY-EFFICIENT OZONE GENERATOR SYSTEM



Ozone generators fitted with ceramic-coated steel electrodes offer greater efficiency and more cost-effective ozonation treatments and can be used in water treatment facilities, hospitals, and pharmacies.



Project Description

Goal: The goal of the project was to develop a procedure for coating metal electrodes in ozone generators, which increases the generators' ability to produce far more ozone safely than conventional ozone generators.

Ceramic coating is sprayed in layers at high temperatures over the metal electrodes. The insulator coating eliminates extensive heat loss and will not break or leak gas into the ozone generator. The addition of ceramic-coated insulators will allow the general construction of future ozone generators to be simpler.

Life Support, Inc., developed this new technology with the help of grants funded by the Inventions and Innovation Program through the Department of Energy's Office of Industrial Technologies.

Progress and Milestones

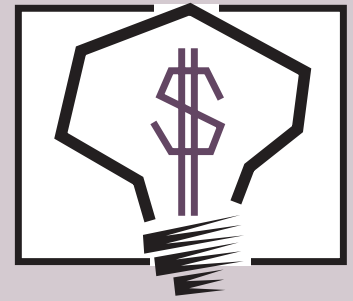
- All work done under the Inventions and Innovation's grant has been completed.
- Work done to date indicates that by optimizing the properties of the dielectric used, further energy savings should be attainable for a total reduction in energy consumption of 60% compared with commercial ozone generator designs currently available.
- As a result of work completed under the grant, the invention is currently being produced and used in the creation of new ozone generators for use in the public sector.
- The ozone generator improvement is protected by U.S. patents 5,552,125 and 5,518,698.

Economics and Commercial Potential

The economics and commercial potential of this project have not yet been fully realized. However, examples of effective ozonation already exist to further the commercialization of ozone generators. Largely due to the health risks associated with chlorination, ozonation is already widely used across Europe for water treatment and will be the only method of water treatment permitted in Sweden after the year 2000. In the United States, chlorination remains the preferred method of water treatment because of its lower cost. Cities like Los Angeles, however, are paving the way for more widespread ozonation. Los Angeles previously had one of the worst water treatment systems in the country. After switching to ozonation, the city now finds its potable water supply to be among the safest in the nation. The potential exists for other cities to follow the example set by Los Angeles, increasing the commercial potential for Life Support's ozone generators.

With direct energy savings over chlorination, these improved ozone generators offer commercial potential for use in the paper and pulp industry where they can be used in place of chlorination or other processes to whiten paper products. Switching to ozonation will not only reduce costs, but also will limit health risks and cut pollution, ultimately benefiting both industry and consumer.

The change made to ozone generators through this project also has an impact on other ozone generators being produced for different uses. For example, the inventor is working on pyrogen-free water systems (systems that are free of fever-producing bacteria) for use in outback areas, such as health clinics in Australia and Africa. This new pyrogen-free system not only treats water, but also sterilizes itself after each use so that no new contaminants seep into the solution. These small ozone generators have great future market potential for use in hospitals in the United States and abroad.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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